CLAIMS

1. (Currently amended) A device, comprising an optical waveguide having a first grating, wherein:

at least a portion of the waveguide has a functional layer adapted to bind an analyte;

<u>a plurality of grooves in the optical waveguide form the first grating;</u>

<u>at least some of the grooves are covered by the functional layer;</u> and

when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide.

2. (Canceled)

3. (Currently amended) The device of claim <u>1</u> [[2]], wherein:

the first grating has an optical reflection band characterized by a center wavelength; and

the binding shifts the center wavelength.

4. (Currently amended) The device of claim 1, comprising ~~two~~ <u>one</u> or more <u>additional</u> optical waveguides, each having a grating, wherein:

each grating has an optical reflection band characterized by a center wavelength; and

at least two gratings have different reflection bands.

5. (Original) The device of claim 4, further comprising an arrayed waveguide grating (AWG) having an input port and two or more output ports coupled to the two or more optical waveguides, wherein, for each optical waveguide, the AWG is adapted to route light having a corresponding center wavelength from the input port to the output port coupled to said optical waveguide.

6. (Original) The device of claim 5, wherein the AWG and the two or more optical waveguides are implemented in a single integrated device.

7. (Original) The device of claim 4, wherein at least two optical waveguides have different functional layers adapted to bind different analytes.

8. (Original) The device of claim 1, comprising a Mach-Zehnder interferometer (MZI) having two arms, wherein one arm includes the optical waveguide.

9. (Original) The device of claim 8, wherein:

the optical waveguide has a second grating; and

the first and second gratings form an optical resonator.

10. (Original) The device of claim 9, wherein:

a section of the optical waveguide between the first and second gratings has the functional layer; and

the binding changes a differential phase shift in the MZI.

11. (Original) The device of claim 1, wherein the first grating is a Bragg grating.

12. (Currently amended) A method for detecting an analyte, comprising:
transmitting light through an optical waveguide having a first grating; and
measuring the transmitted light using a photo-detector, wherein:
at least a portion of the waveguide has a functional layer adapted to bind the analyte;
<u>a plurality of grooves in the optical waveguide form the first grating; and</u>
<u>at least some of the grooves are covered by the functional layer;</u> and
when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide.

13. (Original) The method of claim 12, wherein the first grating is a Bragg grating.

14. (Canceled)

15. (Currently amended) The method of claim <u>12</u> [[14]], wherein:
the first grating has an optical reflection band characterized by a center wavelength; and
the binding shifts the center wavelength.

16. (Currently amended) The method of claim 12, <u>further</u> comprising
transmitting light through ~~two~~ <u>one</u> or more <u>additional</u> optical waveguides, each having a grating; and
measuring the transmitted light using a plurality of photo-detectors, wherein:
each grating has an optical reflection band characterized by a center wavelength; and
at least two gratings have different reflection bands.

17. (Original) The method of claim 16, further comprising routing light via an arrayed waveguide grating (AWG) having an input port and two or more output ports coupled to the two or more optical waveguides, wherein, for each optical waveguide, the AWG is adapted to route light having a corresponding center wavelength from the input port to the output port coupled to said optical waveguide.

18. (Original) The method of claim 16, wherein at least two optical waveguides have different functional layers adapted to bind different analytes.

19. (Original) The method of claim 12, wherein the optical waveguide is a part of one arm of a Mach-Zehnder interferometer (MZI).

20. (Original) The method of claim 19, wherein:
the optical waveguide has a second grating; and
the first and second gratings form an optical resonator.

21. (Original) The method of claim 20, wherein:
a section of the optical waveguide between the first and second gratings is covered by the functional layer;

the binding changes a differential phase shift in the MZI; and.
measuring the transmitted light comprises measuring the differential phase shift.

22. (Original) A device, comprising a Mach-Zehnder interferometer (MZI) having two arms, wherein:

one arm has an optical resonator; and

a section of the resonator has a functional layer adapted to bind an analyte, wherein the optical characteristics of the resonator change, when the analyte binds to the functional layer.

23. (Original) The device of claim 22, wherein:

two Bragg gratings form the optical resonator;

the section having the functional layer is located between the gratings; and

the binding changes a differential phase shift in the MZI.

24. (Currently amended) A method for detecting an analyte, comprising detecting a change in an optical characteristic of an optical waveguide, wherein:

at least a portion of the waveguide has a functional layer adapted to bind the analyte;

a plurality of grooves in the optical waveguide form a grating;

at least some of the grooves are covered by the functional layer; and

when the analyte binds to the functional layer, the binding changes the optical characteristic.

25. (New) A device, comprising an optical waveguide having a first grating, wherein:

at least a portion of the waveguide has a functional layer adapted to bind an analyte;

when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide; and

the device further comprises one or more other optical waveguides, each having a grating, wherein:

each grating has an optical reflection band characterized by a center wavelength; and

at least two gratings have different reflection bands.

26. (New) The device of claim 25, further comprising an arrayed waveguide grating (AWG) having an input port and two or more output ports coupled to the two or more optical waveguides, wherein, for each optical waveguide, the AWG is adapted to route light having a corresponding center wavelength from the input port to the output port coupled to said optical waveguide.

27. (New) The device of claim 26, wherein the AWG and the two or more optical waveguides are implemented in a single integrated device.

28. (New) The device of claim 25, wherein at least two optical waveguides have different functional layers adapted to bind different analytes.

29. (New) A method for detecting an analyte, comprising:

transmitting light through an optical waveguide having a first grating;

measuring the transmitted light using a photo-detector, wherein:
at least a portion of the waveguide has a functional layer adapted to bind the analyte; and
when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide;
transmitting light through one or more other optical waveguides, each having a grating; and
measuring the transmitted light using a plurality of photo-detectors, wherein:
each grating has an optical reflection band characterized by a center wavelength; and
at least two gratings have different reflection bands.

30. (New) The method of claim 29, further comprising routing light via an arrayed waveguide grating (AWG) having an input port and two or more output ports coupled to the two or more optical waveguides, wherein, for each optical waveguide, the AWG is adapted to route light having a corresponding center wavelength from the input port to the output port coupled to said optical waveguide.

31. (New) The method of claim 29, wherein at least two optical waveguides have different functional layers adapted to bind different analytes.

32. (New) A device, comprising an optical waveguide having a first grating, wherein:
at least a portion of the waveguide has a functional layer adapted to bind an analyte;
when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide; and
the device comprises a Mach-Zehnder interferometer (MZI) having two arms, wherein one arm includes the optical waveguide, wherein:
the optical waveguide has a second grating; and
the first and second gratings form an optical resonator.

33. (New) The device of claim 32, wherein the first and second gratings are adapted to couple light in and out of the optical resonator and to generate multiple round trips of the light within the resonator.

34. (New) The device of claim 32, wherein:
a section of the optical waveguide between the first and second gratings has the functional layer; and
the binding changes a differential phase shift in the MZI.

35. (New) A method for detecting an analyte, comprising:
transmitting light through an optical waveguide having a first grating; and
measuring the transmitted light using a photo-detector, wherein:
at least a portion of the waveguide has a functional layer adapted to bind the analyte;
the optical waveguide is a part of one arm of a Mach-Zehnder interferometer (MZI);
the optical waveguide has a second grating;
the first and second gratings form an optical resonator; and
when the analyte binds to the functional layer, the binding changes optical characteristics of the waveguide.

36. (New) The method of claim 35, wherein the first and second gratings are adapted to couple light in and out of the optical resonator and to generate multiple round trips of the light within the resonator.

37. (New) The method of claim 35, wherein:

a section of the optical waveguide between the first and second gratings is covered by the functional layer;

the binding changes a differential phase shift in the MZI; and

measuring the transmitted light comprises measuring the differential phase shift.

38. (New) The device of claim 22, wherein the optical resonator is formed by two gratings adapted to couple light in and out of the optical resonator and to generate multiple round trips of the light within the resonator.